WAR FOOD ADMINISTRATION
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A Summary of the Use of Potatoes in Livestock Feeding Practices with Particular Reference to Potato Ensilage

Potatoes are recognized as a valuable feedstuff for livestock. Because of their high water content 400 to 450 pounds of potatoes are required to equal 100 pounds of grain. They are approximately equal to an average grade of corn silage in protein and in total-digestible nutrients. Potatoes are relatively low in protein, vitamin A, and calcium but rich in starch; hence they must be used in properly-balanced diets. There are several ways in which potatoes are utilized, namely, in the fresh raw state, dried, freshly cooked, as ensilage (either raw or cooked), and with or without admixture with forage crops. Potatoes can be fed to beef and dairy cattle, sheep, horses, swine, and poultry. Cooking is highly desirable for swine and poultry. It is the primary purpose of this review, as an emergency measure, to briefly summarize experiences in this country and abroad on the preservation and use of potatoes in the form of ensilage.

Ensiling of the raw potatoes has been done usually by the addition of 2 to 5 percent of ground corn or ground barley to the chopped potatoes or by placing chopped forage such as alfalfa, grass, or corn fodder in alternate layers with the chopped potatoes. In 1915, the Department of Agriculture (1) reported that for dairy cattle a good silage, preserved in an ordinary silo, could be made by mixing 2 to 5 percent of corn meal with shredded washed potatoes to insure the presence of lactic acid bacteria and thereby promote an acid fermentation.

In a series of lamb-fattening trials, the Colorado Station (2) used a silage made of cull potatoes plus 2 percent of corn chop. The potatoes were run

through a silage cutter into a silo. The need for the addition of some dry roughage was also recognized. A ton of potato silage replaced 186 pounds of shelled corn and 890 pounds of alfalfa hay.

The Idaho Station(3) has used 3 percent of ground barley in place of corn and 3 percent of chopped hay, straw, or corn fodder to absorb excess moisture, with the potatoes. The silage was stored in a trench silo floored with 1" x 12" boards and of a size to suit the feeding operations. The silage was fed to fattening steers.

The German and English literature contains numerous accounts of silages made of green forages and potatoes either mixed or placed in alternate layers. The type of silo has ranged from a stack to a pit. Wallace and Thompson (4), besides describing a cooked potato silage stored in a pit and one made of sliced potatoes and corn meal, state that a stack of silage can be built by spreading one ton of whole potatoes over a one foot layer of green crop and then adding alternate layers of the two materials. The stack is finally covered with soil. The heat of fermentation generated by the green crop partially cooks the potatoes. Another writer (5) presumabably using either a trench or regular silo, regards the correct proportion as 1 foot of grass and 4 inches of whole potatoes and advises that each 3 feet of material be allowed to heat to 90° before more is added. No doubt, the use of wilted forage would be desirable. Such silage is of course, suitable for cattle and sheep, and has been kept as long as a year.

The cooking of potatoes by steam and their preservation as silage in pits or trenches is largely a European innovation. It is done both on the Continent and in the British Isles. Such preserved potatoes are particularly adapted for pigs and poultry since these species do not do so well on raw potatoes as cattle and sheep. The steamed ensiled potatoes are used, however, in feeding cattle and sheep and generally seem to be in considerable favor for feeding all classes of livestock. The method of handling is described (6) somewhat as follows:

Sound, washed potatoes are steamed until soft enough (without being soupy) to pack tightly into the silo. The cooking is done in kettles, by placing the raw potatoes in the silo and inserting steam pipes into the pile, or other schemes to fit the situation. Usually about 30 minutes of steaming is sufficient. The silo may take a variety of forms, a common one being a trench perhaps 5' wide, 4" deep, and of a length to suit the quantity of potatoes. Walls and flooring may even by provided. The cooked potatoes are tamped enough to pack them tightly especially against the sides of the silo and a cover is provided in the form of a layer of straw covered with several inches of soil or equivalent treatment.

Partly because of their bulkiness and partly because of the danger of animals going off feed, of scouring, and of suffering from indigestion, most authorities caution against suddenly changing the ration to a high level of potato feed or of feeding excessively high levels of potatoes. Apparently the potato silage can replace other silages in the rations of cattle (1, 3) and sheep (2) also receiving normal amounts of hay and concentrate feed. In the hog ration, half of the grain can be replaced by cooked potatoes (7, 8). Poultry have been fed rations in which 30 percent of the feed was cooked potatoes (9). Presumably the cooked potato silage can be used interchangeably with fresh cooked potatoes, judging by the European reports.

POTATO SILAGE FOR DAIRY CATTLE

Potatoes can be successfully ensiled by

1. Washing excess dirt off of the potatoes.

2. Running them through a silage cutter along with 250 to 300 pounds of dry hay for each ton of potatoes.

3. Storing in an ordinary type of tower silo or in a well drained trench silo.

CAUTION. Tower type silos should either be well reinforced to withstand lateral pressure or they should be only partially filled. A drain to carry off any free juice should be provided.

Potato silage has a feeding value for dairy cattle a little less than corn silage.

It may be fed in amounts up to 30 to 35 pounds per cow per day.